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SAFETY ENHANCEMENT DEVICE COMBINATION FOR ELECTRICAL

APPARATUS OR APPLIANCES

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a safety enhancement device combination for electrical apparatus or appliances of the type which has a thermal cut-off device in the apparatus, and a non-replaceable fuse in the cordset plug of the apparatus or appliance.

DESCRIPTION OF THE PRIOR ART

Air moving apparatus, appliances with a motor, or with electric heating elements are potentially subject to electrical problems due to accident, misuse, excessive moisture and/or heat, which can cause the wiring in a motor, or the cordset or other wires to short. Motors in appliances often incorporate a thermal cut-off device which reacts to heat increase to shut off the motor. Thermal devices are generally slow acting and designed to sense and react to a gradual heat increase. The heat increase can be caused by a variety of factors such as a slow acting shorting in the motor windings, or bearing failures which would cause air flow across the windings to cease, which causes the windings to heat up.

Thermal devices are most effective at sensing localized heating, such that if a failure occurs at a location remote from the thermal device, the thermal device may not sense the condition, quickly enough to shut the motor down prior to failure.

Rapidly acting remote failures may delay the thermal device operation and damage to the device may result.

A fuse will react to rapid failure conditions, and current increase over its capacity, and will protect components upstream from the motor, such as the cordset. A fuse will also react to foreseeable shorts internal to the switch, lead wires, and motor windings.

A fuse, to be effective, must be non-replaceable in order to insure that the user does not defeat the purpose of the fuse, which is to enhance safety of the thermal fuse thus preventing damage to components or the apparatus or appliance. The combination of these two devices in an electrical apparatus or appliance will enhance the safety of the apparatus or appliance as well as act to protect its components.

SUMMARY OF THE INVENTION

This invention relates to a safety enhancement device combination for an electrical apparatus or appliance which includes a thermal cut-off device in the apparatus and a non-replaceable fuse in the cordset plug.

The principal object of the invention is to provide an enhanced safety device combination to protect electrical apparatus or appliances from damage due to excessive heat or shorts.

A further object of the invention is to provide an enhanced safety device combination as aforesaid that is fast and positive in operation.

A further object of the invention is to provide an enhanced safety device combination as aforesaid that is useful with a wide variety of electrical apparatus or appliances, wherein the appliances may have inductive, capacitive or tungsten type loads. The fuse portion of the enhanced safety device can be matched to the load type by current

value and trip characteristics. Inductive loads where in rush currents start low may use a fast trip fuse. Tungston and capacitive leads with higher in rush currents may be designed with a slow blow.

A further object of the invention is to provide a reliably manufacturable assembly. The high injection pressures involved with molding plastic around the plug assembly can move the component parts, and potentially create an intermittent or open connection. Component parts are encapsulated with a cap and cover preventing the invasion of plastic during the molding operation.

A further object of the invention is to provide an enhanced safety device which is no larger than devices typically found in the marketplace, although containing an additional fuse. This is achieved by locating the device components in slots and cavities integral to the cap.

A further object of the invention is to provide an enhanced safety device combination as aforesaid that is reliable and inexpensive to construct.

A further object of the invention is to provide an enhanced safety device combination as aforesaid that enhances the safety of the apparatus or appliance.

Other objects and advantageous features of the invention will be apparent from the description and claims.

DESCRIPTION OF THE DRAWINGS

The nature and characteristic features of the invention will be more readily understood from the following description taken in connection with the accompanying drawings forming part hereof in which:

Fig. 1 is a schematic of the safety device combination of the invention as installed in an electrical apparatus having an electric motor;

Fig. 2 is a schematic of the apparatus of Fig 1 but showing the internal wiring of the motor;

Fig. 3 is a plan view of the detail of the cordset plug;

Fig 4 is an exploded perspective view of the cordset plug;

Fig 5 is a perspective view in partially assembled condition of the cordset plug, and;

Fig 6 is a perspective view of the molded cordset plug assembly.

It should, of course, be understood that the description and drawings herein are merely illustrative and that various modifications and changes can be made in the structures disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

DESCRIPTION OF THE PREFERRED EMBODIMENT

When referring to the preferred embodiment, certain terminology will be utilized for the sake of clarity. Use of such terminology is intended to encompass not only the described embodiment, but also technical equivalents which operate and function in substantially the same way to bring about the same result.

Referring now more particularly to Figs 1, 2 of the drawings one embodiment of the enhanced safety device combination is therein illustrated, as used with an electric motor 10 of well known type.

The motor 10 has a capacitor 11 of well known type in series therewith and connected thereto by wires 12 and 14.

A cordset plug 15 is provided to be connected to a source of electrical energy (not shown) and has a hot or positive wire 16 and a neutral wire 17 connected thereto, and to a multi-position rotary switch 18 of well known type, illustrated as a three speed switch which may or may not be included in the device. The switch 18 has a high speed wire 20 connected thereto and to the motor windings 21, a medium speed wire 22 connected thereto and to motor windings 21, and a low speed wire 23 connected thereto and to motor windings 21.

The neutral wire 17 is also connected from switch 18 to the motor windings 21 through a thermal cut-off device 25 of well known type.

The thermal cut-off device 25 as illustrated will be activated by a temperature rise, and will open the circuit to cut off the motor 10, and may be of the single use or reset type as desired.

Referring now additionally to Figs 3 – 6 the cordset plug 15 includes two spades 30 and 31 of well known type, with spade 31 connected to neutral wire 17 and engaged in recess 32 of a plug cover 33. The cover 33 is preferably of molded plastic and open at one side. The spade 30 is engaged in recess 34 of cover 33 and connected to a fuse 35 of well known type, which fuse 35 is rated at the desired current capacity and engaged in recess 36 of cover 33, and connected to hot wire 16. A cap 38 is provided which snaps into cover 33, which as shown in Fig 6 is covered with a continuous layer 40 of plastic, preferably plastic applied in a mold (not shown) which encapsulates cover 33 and cap 38, making the fuse 35 inaccessible to the consumer.

The mode of operation will now be pointed out. In use the cordset plug 15 is connected to a source of electrical energy (not shown) and when desired the apparatus is

energized by rotating switch 18 and motor 10 is activated. Should the motor windings 21 overheat in a foreseeable manner, the thermal cut-off device 25 will be activated and the motor 10 will be shut down.

Should there be a foreseeable failure of the system remote from the thermal cut-off device, the current will rise rapidly, fuse 35 will blow and the current flow through wire 16 will be broken thereby shutting down motor 10.

While the combination is illustrated as used with an electric motor it can be used with other electrical apparatus such as an air moving device, a heater, or an appliance where protection is desired. It will thus be apparent that the objects of the invention have been achieved.

I CLAIM

1. An enhanced safety device combination for electrical apparatus or appliances which comprises,

a cordset connected to said apparatus or appliance,

said cordset having a set of wires including at least a neutral wire and a positive wire,

a cordset plug connected to said wires,

a fuse in said plug connected in series with said one of said wires,

said wires are connected to switch means,

second wires connecting said switch means to said apparatus or appliance, and

a thermal cut-off device in series with said one of said second wires and said apparatus or appliance.
2. An enhanced safety device combination as defined in claim 1 in which

said switch means is a multi-position rotary switch.
3. An enhanced safety device combination as desired in claim 1 in which

said fuse is in series with said positive wire.
4. An enhanced safety device combination as defined in claim 1 in which

said cordset plug includes a plug cover open at one side,

a cap which snaps into said cover to close off the open side,

at least two spades extending from said plug carried in said cover, and which may be connected to said switch means by said set of wires, and an outer layer of plastic encapsulating said cover and said cap, thereby preventing access to said fuse.

[illegible]

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FIG. 1

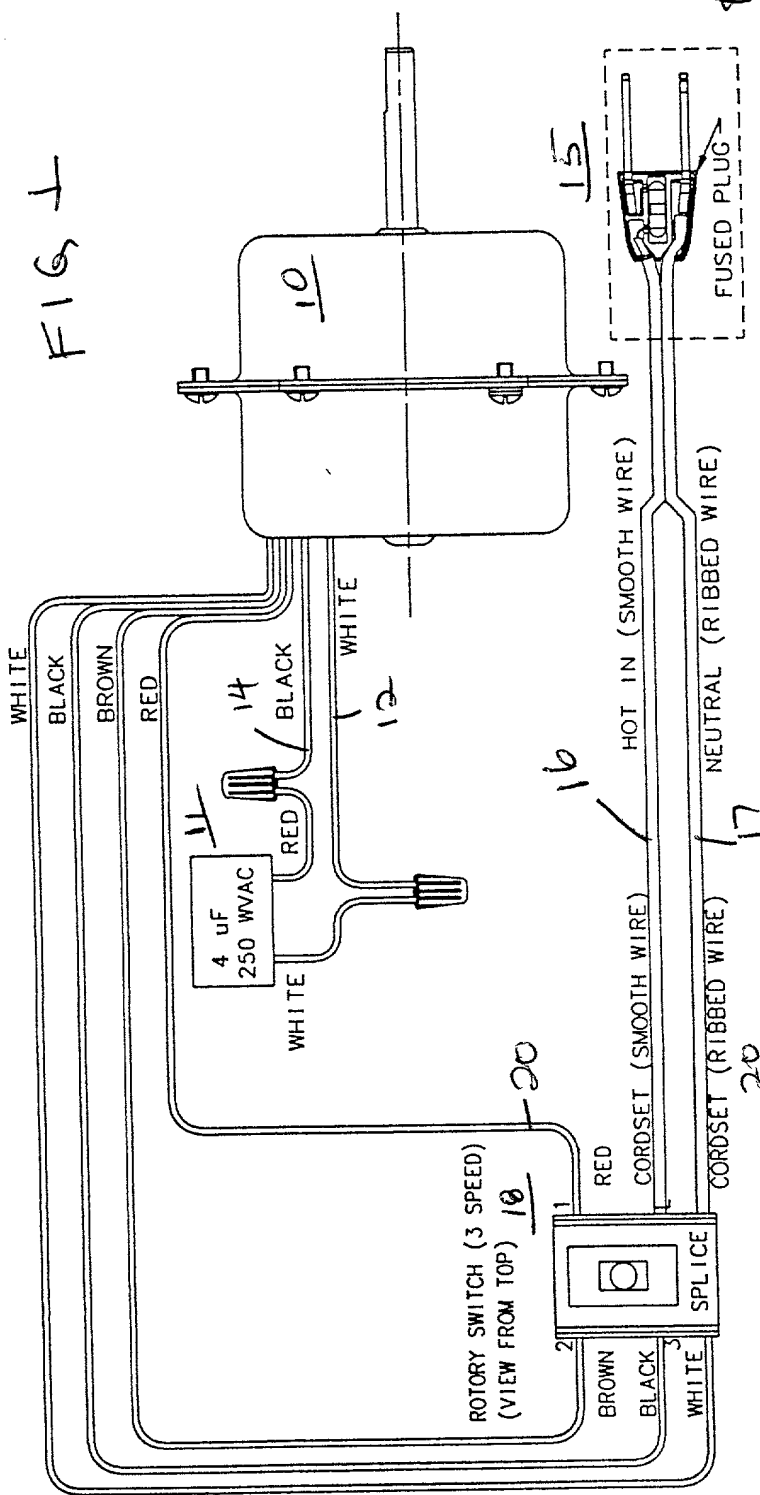


FIG. 3

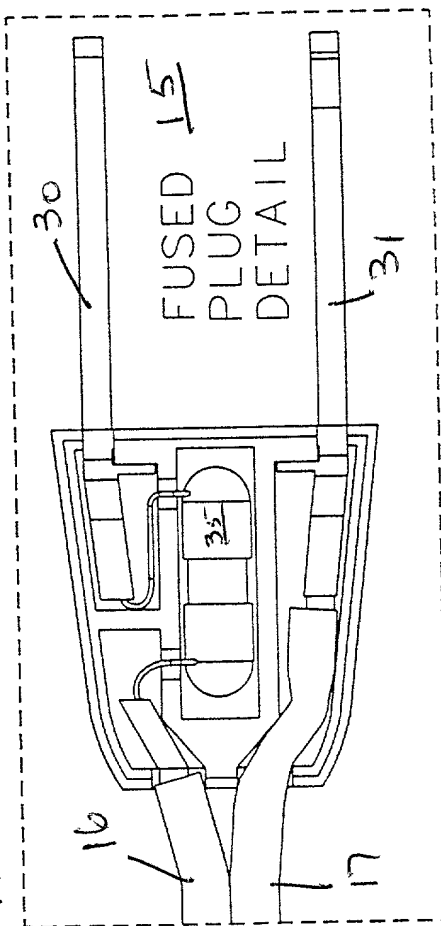
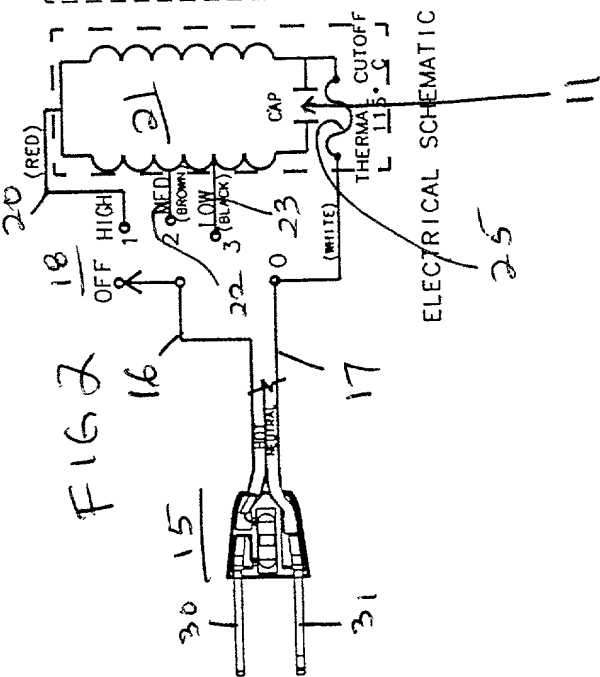
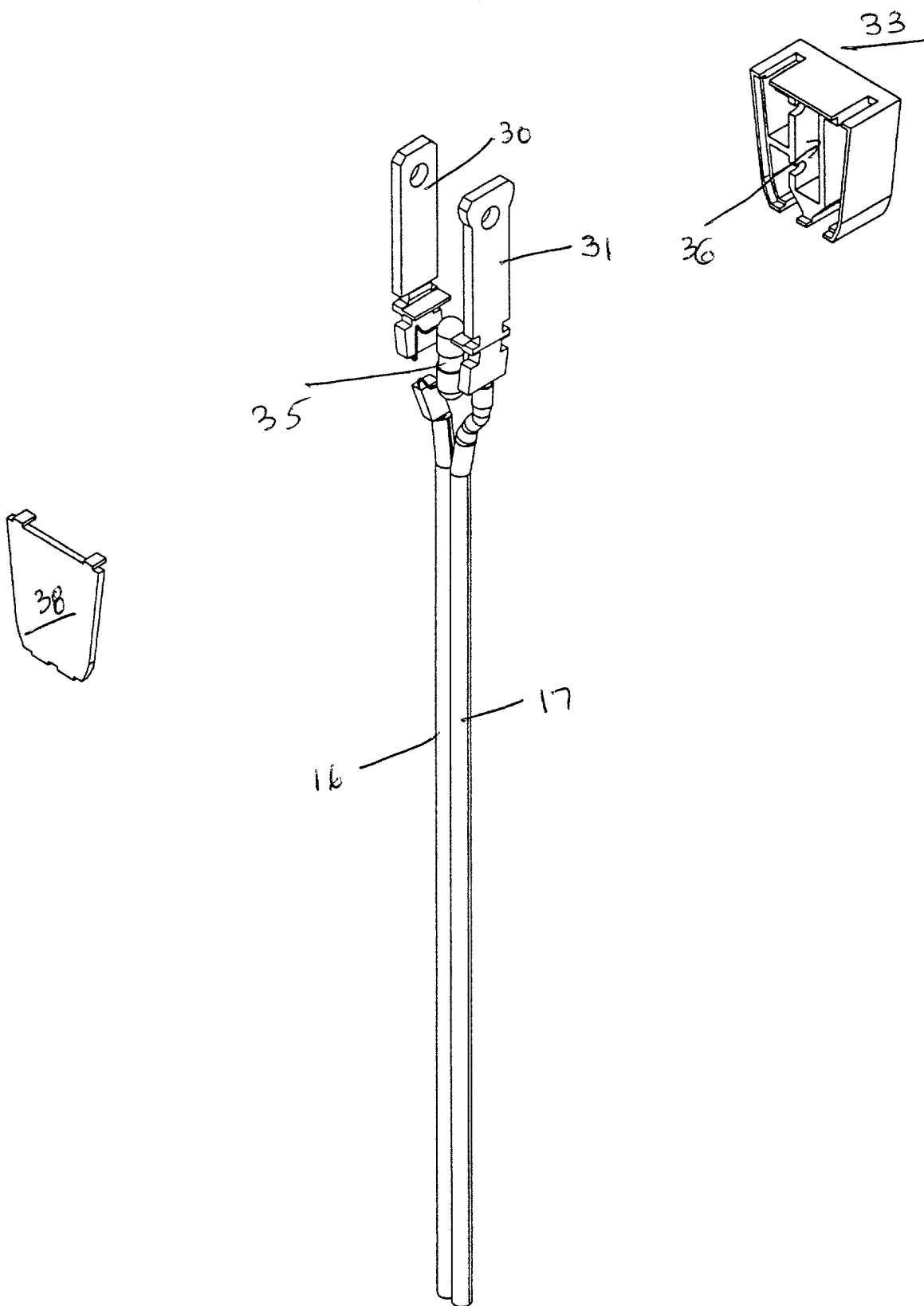


FIG. 2



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FIG 4



Variable	Mean	SD	Min	Max
Age	34.5	10.2	18	65
Gender	0.5	0.5	0	1
Marital status	0.7	0.5	0	1
Education	12.5	1.5	9	16
Income	15.2	5.8	5	35
Health status	0.8	0.4	0	1
Stress level	3.2	1.5	1	5
Life satisfaction	4.5	1.2	3	6
Work engagement	3.8	1.1	2	5
Organizational commitment	4.2	1.0	3	5
Job satisfaction	4.0	1.1	3	5
Turnover intention	1.5	0.8	0	3
Organizational citizenship behavior	3.5	1.0	2	5
Employee well-being	4.8	1.2	3	6
Work-life balance	3.0	1.5	1	5
Job autonomy	3.5	1.2	2	5
Supervisor support	4.0	1.1	3	5
Team cohesion	4.2	1.0	3	5
Organizational culture	4.5	1.2	3	6
Leadership style	3.8	1.1	2	5
Employee engagement	4.0	1.1	3	5
Organizational performance	4.5	1.2	3	6
Customer satisfaction	4.2	1.0	3	5
Employee retention	4.0	1.1	3	5
Organizational innovation	4.5	1.2	3	6
Employee productivity	4.0	1.1	3	5
Organizational reputation	4.5	1.2	3	6
Employee loyalty	4.0	1.1	3	5
Organizational commitment	4.2	1.0	3	5
Employee well-being	4.8	1.2	3	6
Work-life balance	3.0	1.5	1	5
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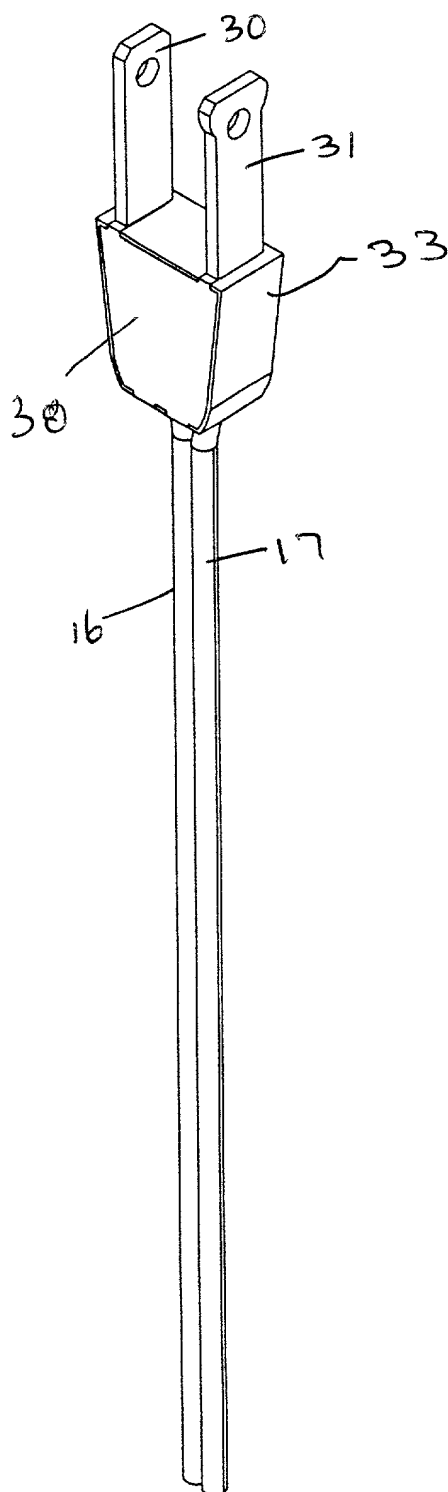
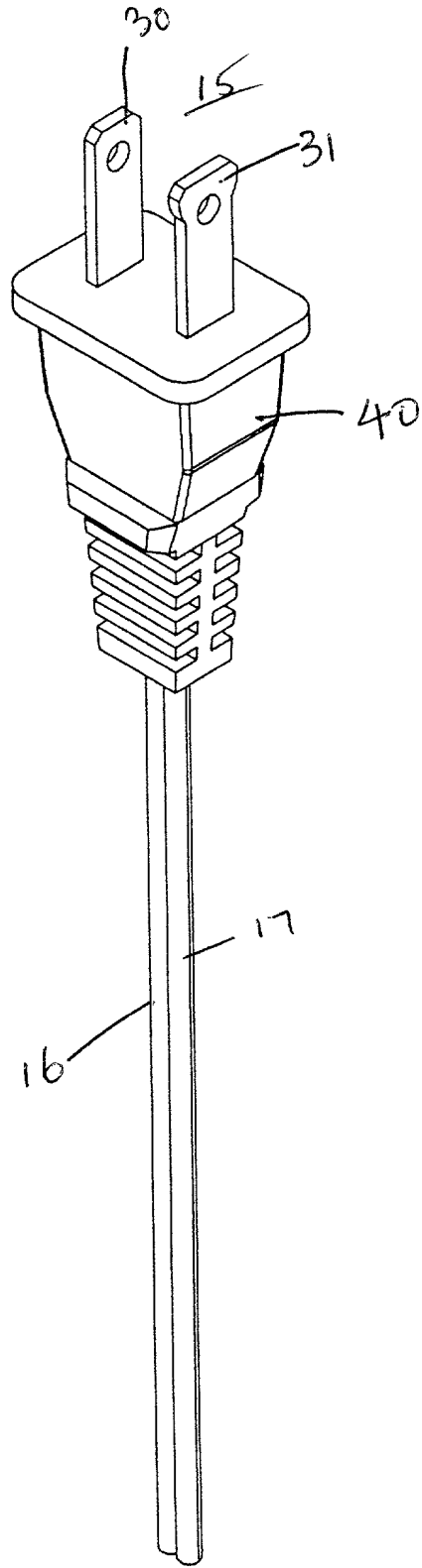


FIG 6



DECLARATION, POWER OF ATTORNEY AND POWER TO INSPECT

As a below named inventor, I hereby declare:

that my residence, post office address and citizenship are as stated below next to my name;

that I verily believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the utility entitled **SAFETY DEVICE COMBINATION FOR ELECTRICAL APPARATUS**

the specification of which [check one(s) applicable] **OR APPLIANCES**

_____ was filed _____ as PCT International/U.S. Application No. _____
and was amended by Amendment filed _____ (if applicable); [or]
XXX is attached to this Declaration, Power of Attorney and Power to Inspect;

that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above; and

that I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Rule 56(a) [37CRF§1.56(a)]

POWER OF ATTORNEY: As Inventor, I hereby appoint **ZACHARY T. WOBENSMITH, III**, Reg. NO. 26,524 of **PIPERSVILLE, Pennsylvania**, as my attorney with full power of substitution to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith;

POWER TO INSPECT: I hereby give **ZACHARY T. WOBENSMITH, III**, of **PIPERSVILLE, Pennsylvania** or his duly accredited representatives power to inspect and obtain copies of the papers on file relating to this application.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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